



# Top SQL Interview Questions

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# 90+ SQL Interview Questions and Answers to crack top companies Interviews in 2024

Important SQL interview questions focused for both Freshers and Experienced:

[Basic SQL Interview Questions for Freshers](#)

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Did you know?

- SQL has hidden languages: Transact SQL (T-SQL) can turn your queries into mini-programs with control flow statements.
- One of the SQL server development tools called "Juneau" is also the second-largest city in the United States of America in the Alaska Region.

- You can ask SQL questions: [fuzzy matching](#) and [regular expressions](#) can help you search for information even with incorrect spellings.
- SQL is a shapeshifter. With the ability to transform data dynamically, PIVOT and UNPIVOT can transform data from column to row and vice versa.

## Basic SQL Interview Questions for Freshers

### 1. Define Database.

A [database](#) is an organized collection of structured data that can be stored, easily accessed, managed, and retrieved digitally from a remote or local computer system. Databases can be complex and vast and are built with a fixed design and modeling approach. While smaller databases can be stored on a file system, large ones are hosted on computer clusters or cloud storage.

### 2. What is the difference between DBMS and RDBMS?

A database management system or [DBMS](#) is system software that can create, retrieve, update, and manage a database. It ensures the consistency of data and sees to it that it is organized and easily accessible by acting as an interface between the database and its end-users or [application software](#). DBMS can be classified into four types:

- Hierarchical Database: It has a treelike structure with the data being stored in a hierarchical format. A parent in a hierarchical database can have multiple children, but a child can have only one parent.
- Network Database: This type of database is presented as a graph that can have many-to-many relationships, allowing entities to have multiple connections.

- Relational Database: It is the most widely used and easy-to-use database. It is represented as a table and the values in the columns and rows are related to each other.
- Object-Oriented Database: The data values and operations are stored as objects in this type of database, and these objects have multiple relationships among them.

An RDBMS stores data in the form of a collection of [tables](#). The relations are defined between the common fields of these tables. MS SQL Server, MySQL, IBM DB2, Oracle, and [Amazon Redshift](#) are all based on RDBMS.

#### DBMS Vs. RDBMS

Parameters	DBMS	RDBMS
Access	Data elements need to be accessed separately	Multiple data elements can be accessed at the same time
Relationship Between Data	No relationship between data	Data in tables are related to each other
Normalization	It is not present	It is present
Distributed Database	It does not support distributed databases.	It supports distributed database
Data Storage Format	Data is stored in either a navigational or hierarchical form	Data is stored in a tabular structure with headers being the column names and the rows containing the corresponding values

Amount of Data	It deals with a small quantity of data	It deals with a larger amount of data
Data Redundancy	It is prevalent	Keys and indexes do not allow data redundancy
Number of Users	It supports a single user	It supports multiple users
Data Fetching	It is slower for large amounts of data	It is speedy due to the relational approach
Data Security	Low-security levels when it comes to data manipulation	Multiple levels of <a href="#">data security</a> exist
Software and Hardware Requirements	Low	High
Examples	<a href="#">XML</a> , Window Registry, etc.	MySQL, SQL Server, Oracle, <a href="#">Microsoft Access</a> , PostgreSQL, etc.

### 3. What is SQL?

[SQL](#) stands for Structured Query Language. It is the standard language for RDBMS and is useful in handling organized data with entities or variables with relations between them. SQL is used for communicating with databases.

According to ANSI, SQL is used for maintaining RDBMS and for performing different operations of data manipulation on different **datatypes** by using the **features of SQL**. It is a database language that is used for the creation and deletion of databases. It can also be used, among other things, to fetch and modify the rows of a table.

## 4. What is normalization and what are its types?

**Normalization** is used to reduce data redundancy and dependency by organizing fields and tables in databases. It involves constructing tables and setting up relationships between those tables according to certain rules. The redundancy and inconsistent dependency can be removed using these rules to make normalization more flexible.

The different forms of normalization are as follows:

- First Normal Form: If every attribute in a relation is single-valued, then it is in the first normal form. If it contains a composite or multi-valued attribute, it violates the first normal form.
- Second Normal Form: A relation is said to be in the second normal form if it has met the conditions for the first normal form and does not have any partial dependency, i.e., it does not have a non-prime attribute that relies on any proper subset of any candidate key of the table. Often, the solution to this problem is to specify a single-column primary key.
- Third Normal Form: A relation is in the third normal form when it meets the conditions for the second normal form and there is not any transitive dependency between the non-prime attributes, i.e., all the non-prime attributes are decided only **by** the candidate keys of the relation and not by other non-prime attributes.
- Boyce-Codd Normal Form: A relation is in the Boyce-Codd normal form or BCNF if it meets the conditions of the third normal form, and for every functional dependency, the left-hand side is a super key. A relation is in BCNF if and only if X is a super key for every non-trivial functional dependency in form  $X \rightarrow Y$ .

## 5. What is denormalization?

Denormalization is the opposite of normalization; redundant data is added to speed up complex queries that have multiple tables that need to be joined. Optimization of the read performance of a database is attempted by adding or grouping redundant copies of data.

*Know the most common methods for executing function in sql by exploring our blog on [how to run function in SQL!](#)*

## 6. What are Joins in SQL?

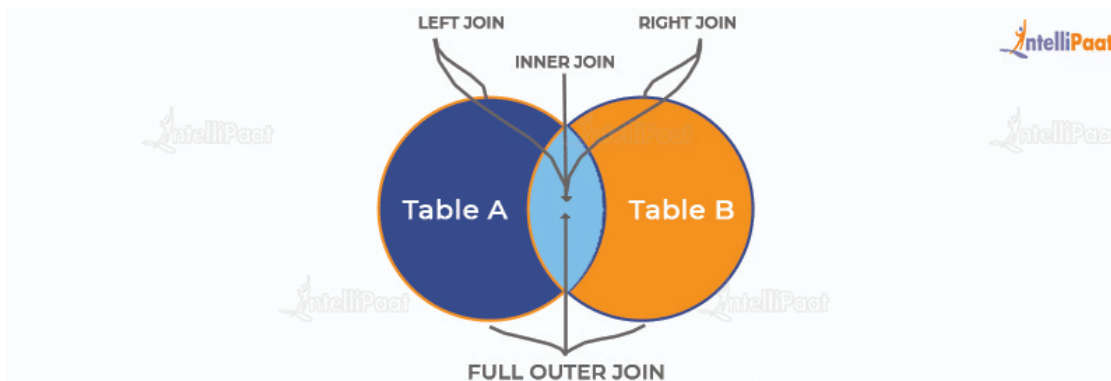
**JOINS in SQL** is used to combine rows from two or more tables based on a related column between them. Various types of JOINS can be used to retrieve data, depending on the relationship between tables.

There are four types of Joins:

- Inner Join
- Left Join
- Right Join
- Full Join

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## 7. Explain the types of SQL joins.



There are four different types of SQL Joins:

(Inner) Join: An inner join is used to retrieve the records that have matching values in tables involved in the join. It combines rows from two tables based on a related column and returns only the matching record. [Inner Join](#) is mostly used to join queries.

```
1  SELECT *  
  
2  FROM Table_A  
  
3  JOIN Table_B;  
  
4  SELECT *  
  
5  FROM Table_A  
  
6  INNER JOIN Table_B;
```

Left (Outer) Join: The use of [left join](#) is to retrieve all the records or rows from the left and the matched ones from the right.

```
1  SELECT *  
  
2  FROM Table_A A  
  
3  LEFT JOIN Table_B B  
  
4  ON A.col = B.col;
```

Right (Outer) Join: The use of [Right join](#) is to retrieve all the records or rows from the right and the matched ones from the left.



```
1  SELECT *  
  
2  FROM Table_A A  
  
3  RIGHT JOIN Table_B B  
  
4  ON A.col = B.col;
```

Full (Outer) Join: The use of [Full join](#) is to retrieve the records that have a match either in the left table or the right table.

```
1  SELECT *  
  
2  FROM Table_A A  
  
3  FULL JOIN Table_B B  
  
4  ON A.col = B.col;
```

Ace your next SQL interview with our expert-written [Sql Join Query Interview Questions](#).

## 8. What are the subsets of SQL?

[SQL queries](#) are divided into four main categories:

- Data Definition Language (DDL)  
DDL queries are made up of SQL commands that can be used to define the structure of the database and modify it.
  - CREATE: Used to create databases, tables, indexes, views, and other database objects.

- DROP: Used to delete databases, tables, views, and other database objects.
- ALTER TABLE ... DROP COLUMN: Used to remove a column from an existing table.
- ALTER: Used to modify the structure of an existing table, such as adding, deleting, or modifying columns.
- TRUNCATE: Used to remove all records from a table but retains the table's structure for future use.
- ALTER TABLE ... ADD COLUMN: Used to add a new column to an existing table.
- Data Manipulation Language (DML)  
These SQL queries are used to manipulate data in a database.
  - SELECT INTO: Selects data from one table and inserts it into another
  - INSERT: Inserts data or records into a table
  - UPDATE: Updates the value of any record in the database
  - DELETE: Deletes records from a table
- Data Control Language (DCL)  
These SQL queries manage the access rights and permission control of the database.
  - GRANT: Grants access rights to database objects
  - REVOKE: Withdraws permission from database objects
- Transaction Control Language (TCL)  
TCL is a set of commands that essentially manages the transactions in a database and the changes made by the DML statements. TCL allows statements to be grouped together into logical transactions.
  - COMMIT:
    - Commits an irreversible transaction, i.e., the previous image of the database before the transaction cannot be retrieved.
  - When a transaction is committed using the COMMIT statement in SQL, it permanently saves the changes made within the transaction to the database. Once committed, the changes cannot be rolled back or undone, and the previous state of the database before the transaction cannot be

retrieved without restoring from a backup or utilizing other data recovery methods.

- ROLLBACK:Reverts the steps in a transaction in case of an error
- SAVEPOINT:Sets a savepoint in the transaction to which rollback can be executed
- SET TRANSACTION:Sets the characteristics of the transaction

Discover the syntax for [not equal to operator in SQL](#) as well as how to use this operator to compare and omit the value in the data.

## 9. What are the applications of SQL?


The major applications of SQL are listed below:

- Writing data integration scripts
- Setting and running analytical queries
- Retrieving subsets of information within a database for analytics applications and transaction processing
- Adding, updating, and deleting rows and columns of data in a database

## 10. What is a DEFAULT constraint?

[Constraints in SQL](#) are used to specify some sort of rules for processing data and limiting the type of data that can go into a table. Now, let us understand what a default constraint is.

A default constraint is used to define a default value for a column so that it is added to all new records if no other value is specified. For example, if we assign a default constraint for the E\_salary column in the following table and set the default value to 85000, all the entries in this column will have the default value of 85000, unless no other value has been assigned during the insertion.



	E_id	E_name	E_salary	E_gender	E_dept
1	1	Sam	85000	Male	Analytics
2	2	Anne	85000	Male	Analytics
3	3	Julia	85000	Female	Analytics

Diagram illustrating default values for columns E\_id, E\_name, E\_salary, E\_gender, and E\_dept. Dashed arrows point from the text "Default values" to the respective columns.

Now, let us go through how to set a default constraint. We will start by creating a new table and adding a default constraint to one of its columns.

Code:

```
1 create table stu1(s_id int, s_name varchar(20), s_marks int
  default 50)
2 select *stu1
```

Output:

s_id	s_name	s_marks
------	--------	---------

Now, we will insert the records.

Code:

```
1 insert into stu1(s_id,s_name) values (1,'Sam')
2 insert into stu1(s_id,s_name) values (2,'Bob')
3 insert into stu1(s_id,s_name) values (3,'Matt')
```

```
4 select *from stu1
```

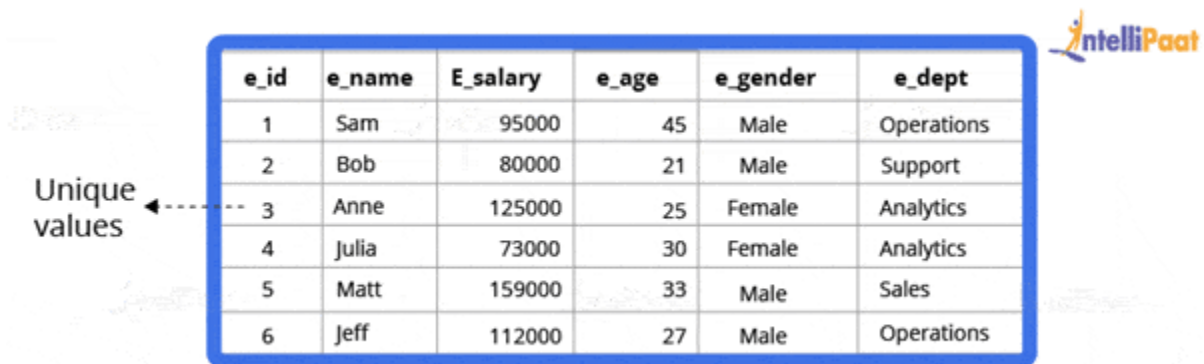
Output:

	s_id	s_name	s_marks
1	1	Sam	50
2	2	Bob	50
3	3	Matt	50

Also, learn from our blog on [MySQL Interview Questions and Answers](#) to crack any Interview.

## 11. What is a UNIQUE constraint?

Unique constraints ensure that all the values in a column are different. For example, if we assign a unique constraint to the e\_name column in the following table, then every entry in this column should have a unique value.



e_id	e_name	E_salary	e_age	e_gender	e_dept
1	Sam	95000	45	Male	Operations
2	Bob	80000	21	Male	Support
3	Anne	125000	25	Female	Analytics
4	Julia	73000	30	Female	Analytics
5	Matt	159000	33	Male	Sales
6	Jeff	112000	27	Male	Operations

First, we will create a table.

```
1 create table stu2(s_id int unique, s_name varchar(20))
```

Now, we will insert the records.

```
1 insert into stu2 values (1,'Julia')  
  
2 insert into stu2 values (2,'Matt')  
  
3 insert into stu2 values (3,'Anne')
```

Output:



	s_id	s_name
1	1	Julia
2	2	Matt
3	3	Anne

A PRIMARY KEY constraint will automatically have a UNIQUE constraint. However, unlike a PRIMARY KEY, multiple UNIQUE constraints are allowed per table.

## 12. What is meant by table and field in SQL?

An organized [data](#) in the form of rows and columns is said to be a table. Simply put, it is a collection of related data in a table format.

Here rows and columns are referred to as tuples and attributes, and the number of columns in a table is referred to as a field. In the record, fields represent the characteristics and attributes and contain specific information about the data.

*Prepare yourself for PostgreSQL from our [PostgreSQL interview questions](#) blog.*

## 13. What is a primary key?

A primary key is used to uniquely identify all table records. It cannot have NULL values and must contain unique values. Only one primary key can exist in one table, and it may have single or multiple fields, making it a [composite key](#).

Now, we will write a query to demonstrate the use of a primary key for the employee table:

```
1  //  
  
2  CREATE TABLE Employee (  
  
3  ID int NOT NULL,  
  
4  Employee_name varchar(255) NOT NULL,  
  
5  Employee_designation varchar(255),  
  
6  Employee_Age int,  
  
7  PRIMARY KEY (ID)  
  
8  );
```

## 14. What is a unique key?

A key that can accept only a null value and cannot accept duplicate values is called a unique key. The role of a unique key is to make sure that all columns and rows are unique.

The syntax for a unique key will be the same as the primary key. So, the query using a unique key for the employee table will be as follows:

```
1  //

2  CREATE TABLE Employee (

3  ID int NOT NULL,

4  Employee_name varchar(255) NOT NULL,

5  Employee_designation varchar(255),

6  Employee_Age int,

7  UNIQUE (ID)

8  );
```

## 15. What is the difference between a primary key and a unique key?

Both primary and unique keys carry unique values but a primary key cannot have a null value, while a unique key can. In a table, there cannot be more than one primary key, but there can be multiple unique keys.

## 16. What is a foreign key?

A foreign key is an attribute or a set of attributes that reference the primary key of some other table. Basically, a foreign key is used to link together two tables together.

Let us create a foreign key for the following table:





PersonID	LastName	FirstName	Age
1	Rehman	Sayeedul	30
2	Soni	Anand	23
3	Singh	Abhishek	20

OrderID	OrderNumber	PersonID
1	90000	3
2	135000	3
3	77000	2
4	154000	1

```
1 CREATE TABLE Orders (  
2 OrderID int NOT NULL,  
3 OrderNumber int NOT NULL,  
4 PersonID int,  
5 PRIMARY KEY (OrderID),  
6 FOREIGN KEY (PersonID) REFERENCES Persons(PersonID)  
7 )
```

## 17. What are the benefits of SQL database over NoSQL database?

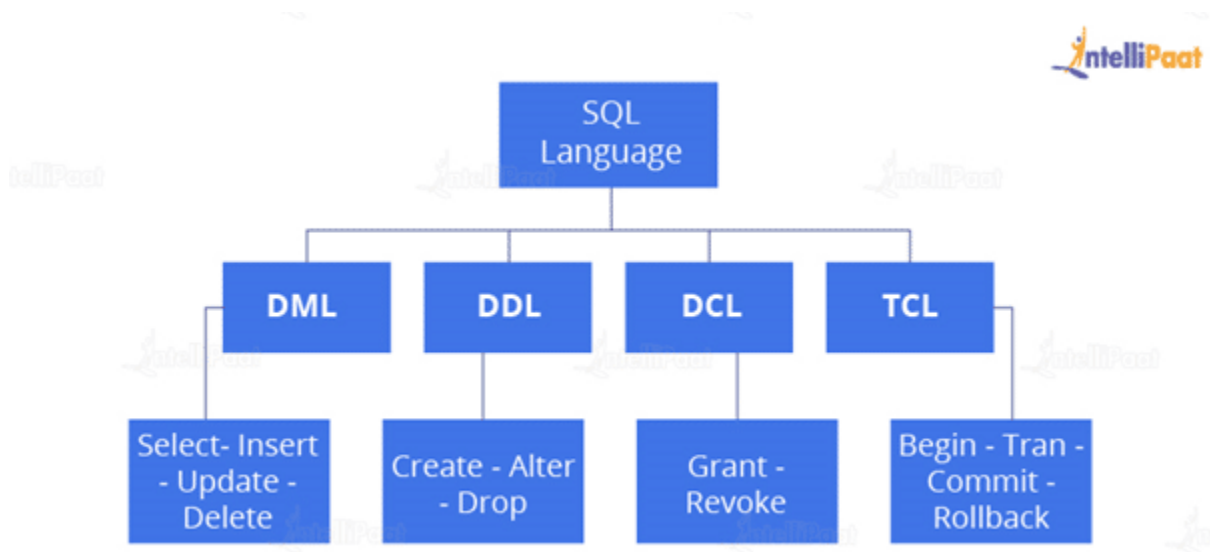
SQL (Structured Query Language) and NoSQL (Not Only SQL) are different database management systems, each offering unique advantages. Here, we will discuss the benefits of SQL over NoSQL in a comprehensive manner.

1. **Schema and Data Consistency:** SQL databases enforce a predefined schema, ensuring the data is structured and follows specific rules. It results in a higher level of data consistency, reducing the risk of data corruption or inconsistencies. On the other hand, NoSQL databases are schema-less, allowing for more flexibility but potentially sacrificing consistency.
2. **ACID Compliance:** SQL databases are designed to follow the ACID (Atomicity, Consistency, Isolation, Durability) principles. These properties guarantee transactional integrity, ensuring that database operations are reliable and maintain data integrity. NoSQL databases may sacrifice some of these properties for scalability and performance advantages.
3. **Advanced Querying Capabilities:** SQL databases provide a rich set of powerful querying capabilities through SQL. It allows for complex joins, aggregations, filtering, and data sorting. SQL queries are expressive and can handle complex relationships between tables efficiently. NoSQL databases may have limited querying capabilities, often requiring additional programming logic to achieve similar results.
4. **Data Integrity and Validation:** SQL databases offer built-in mechanisms for data integrity and validation through constraints, such as unique keys, foreign key relationships, and check constraints. These features ensure data quality and prevent invalid or inconsistent data insertion. NoSQL databases may require additional application-level logic to enforce data integrity.
5. **Mature Ecosystem and Tooling:** SQL databases have been around for decades and have a well-established ecosystem with many tools, libraries, and frameworks. It includes robust backup and recovery solutions, monitoring tools, and mature integration options. Being

relatively newer, NoSQL databases may have a more limited tooling and ecosystem.

*Interested in SQL? Check out this blog on [How to Become an SQL Developer](#) to get ahead in your career.*

## 18. Explain the different types of SQL commands.



### Types of SQL Languages

- DDL: DDL is that part of SQL that defines the data structure of the database in the initial stage when the database is about to be created. It is mainly used to create and restructure database objects. Commands in DDL are:
  - Create table
  - [Alter table](#)
  - Drop table
- DML: DML is used to manipulate already existing data in a database, i.e., it helps users to retrieve and manipulate data. It is used to perform operations such as inserting data into the database through the insert

command, updating data with the update command, and deleting data from the database through the delete command.

- DCL: DCL is used to control access to the data in the database. DCL commands are normally used to create objects related to user access and to control the distribution of privileges among users. The commands that are used in DCL are Grant and Revoke.
- TCL: TCL is used to control the changes made by DML commands. It also authorizes the statements to assemble in conjunction with logical transactions. The commands that are used in TCL are Commit, Rollback, Savepoint, Begin, and Transaction.

Also, Have a look at [SQL Command Cheatsheet](#).

## 19. What are the uses of SQL?

The following operations can be performed by using a SQL database:

- Creating new databases
- Inserting new data
- Deleting existing data
- Updating records
- Retrieving the data
- Creating and dropping tables
- Creating functions and views
- Converting data types

## 20. What is an index?

[Indexes](#) help speed up searching in a database. If there is no index on a column in the [WHERE clause](#), then the SQL Server has to skim through the entire table and check each and every row to find matches, which may result in slow operations with large data.

Indexes are used to find all rows matching with some columns and then to skim through only those subsets of the data to find the matches.

Syntax:

```
1 CREATE INDEX INDEX_NAME ON TABLE_NAME (COLUMN)
```

## 21. Explain the types of indexes.

Single-Column Indexes: A single-column index is created for only one column of a table.

Syntax:

```
1 CREATE INDEX index_name  
2 ON table_name(column_name);
```

Composite-Column Indexes: A composite-column index is created for two or more columns of a table.

Syntax:

```
1 CREATE INDEX index_name  
2 ON table_name (column1, column2)
```

Unique Indexes: A unique index is used to maintain the data integrity of a table. A unique index does not allow multiple values to be inserted into the table.

Syntax:

```
1 CREATE UNIQUE INDEX index
```

```
2 ON table_name(column_name)
```

## 22. What are entities and relationships?

Entities: An entity can be a person, place, thing, or any identifiable object for which data can be stored in a database.

For example, in a company's database, employees, projects, salaries, etc., can be referred to as entities.

Relationships: A relationship between entities can be referred to as a connection between two tables or entities.

For example, in a college database, the student entity and the department entity are associated with each other.

That ends the section of basic interview questions. Let us now move on to the next section of intermediate interview questions.

## Intermediate SQL Interview Questions and Answers

### 23. What are SQL operators?

**SQL operators** are the special keywords or characters that perform specific operations. They are also used in SQL queries. These operators can be used within the WHERE clause of **SQL commands**. Based on the specified condition, SQL operators filter the data.

The SQL operators can be categorized into the following types:

- Arithmetic Operators: For mathematical operations on numerical data
  - addition (+)
  - subtraction (-)
  - multiplication (\*)
  - division (/)
  - remainder/modulus (%)
- Logical Operators: For evaluating the expressions and returning results in True or False
  - ALL
  - AND
  - ANY
  - ISNULL
  - EXISTS
  - BETWEEN
  - IN
  - LIKE
  - NOT
  - OR
  - UNIQUE
- Comparison Operators: For comparisons of two values and checking whether they are the same or not
  - equal to (=)
  - not equal to (!= or <>)
  - less than (<),
  - greater than (>)
  - less than or equal to (<=)
  - greater than or equal to (>=)
  - not less than (!<)
  - not greater than (!>)
- Bitwise Operators: For bit manipulations between two expressions of integer type. It first performs the conversion of integers into binary bits and then applied operators

- AND (& symbol)
  - OR (|, ^)
  - NOT (~)
- Compound Operators: For operations on a variable before setting the variable's result to the operation's result
  - Add equals (+=)
  - subtract equals (-=)
  - multiply equals (\*=)
  - divide equals (/=)
  - modulo equals (%=)
- String Operators: For concatenation and pattern matching of strings
  - + (String concatenation)
  - += (String concatenation assignment)
  - % (Wildcard)
  - [] (Character(s) matches)
  - [^] (Character(s) not to match)
  - \_ (Wildcard match one character)

## 24. What do you mean by data integrity?

**Data integrity** is the assurance of the accuracy and consistency of data over its whole life cycle. It is a critical aspect of the design, implementation, and usage of systems that store, process, or retrieve data.


Data integrity also defines integrity constraints for enforcing business rules on data when it is entered into a database or application.

## 25. What is a data warehouse?

A **data warehouse** is a large store of accumulated data, from a wide range of sources, within an organization. The data helps drive business decisions.



## 26. How would you find the second highest salary from the following table?

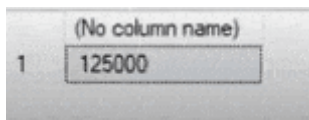


e_id	e_name	E_salary	e_age	e_gender	e_dept
1	Sam	95000	45	Male	Operations
2	Bob	80000	21	Male	Support
3	Anne	125000	25	Female	Analytics
4	Julia	73000	30	Female	Analytics
5	Matt	159000	33	Male	Sales
6	Jeff	112000	27	Male	Operations

Code:

```
1 select * from employee
2 select max(e_salary) from employee
3 where e_salary not in (select max(e_salary)
4 from employee)
```

Output:



(No column name)
1 125000

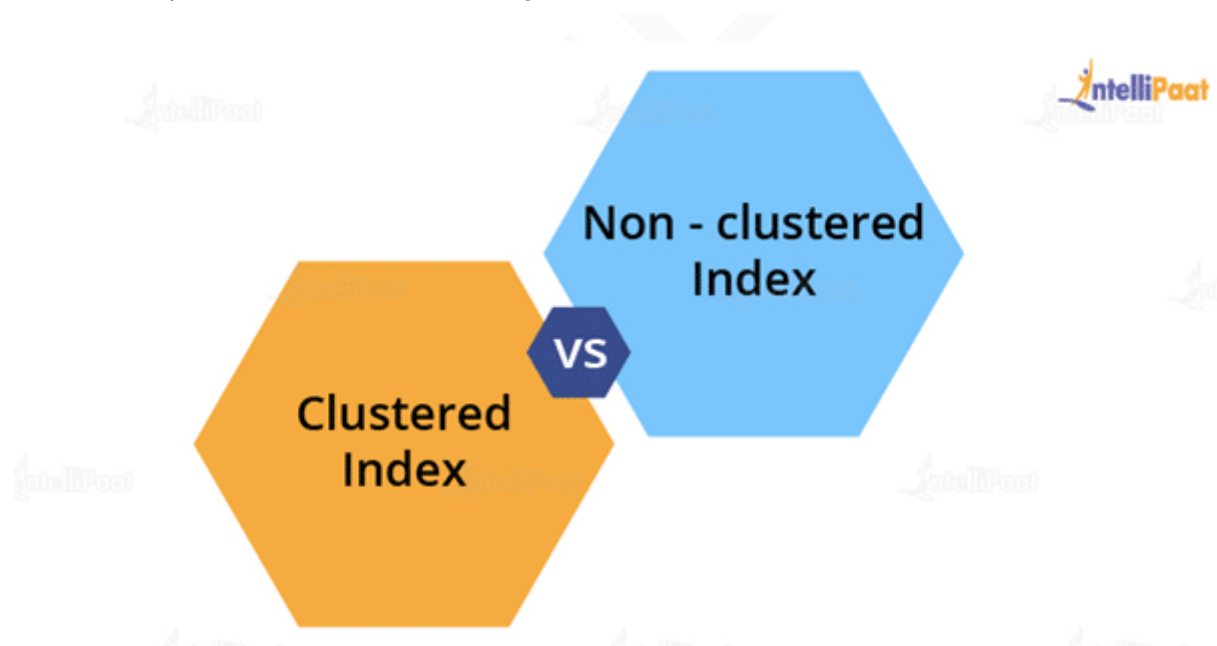
## 27. Why is the FLOOR function used in SQL Server?

The FLOOR() function helps to find the largest integer value for a given number, which can be an equal or lesser number.

Are you planning to learn SQL Server? Here is the [SQL Certification training](#). Enroll now!

## 28. State the differences between clustered and non-clustered indexes

- **Clustered Index:** It is used to sort the rows of data by their key values. A clustered index is like the contents of a phone book. We can directly open the book on David's index (for "David, Thompson") and find information for all Davids right next to each other. Since the data are located next to each other, it helps a lot in fetching the data based on range-based queries. A clustered index is actually related to how the data is stored; only one clustered index is possible per table.
- **Non-Clustered Index:** It stores data at one location and indexes at another location. The index has pointers that point to the location of the data. As the indexes in a non-clustered index are stored in a different place, there can be many non-clustered indexes for a table.



State the differences between the Clustered and Non-clustered indexes

Now, we will see the major differences between clustered and non-clustered indexes:

Parameters	Clustered Index	Non-Clustered Index
Used For	Sorting and storing records physically in memory	Creating a logical order for data rows; pointers are used for physical data files
Methods for Storing	Stores data in the leaf nodes of the index	Never stores data in the leaf nodes of the index
Size	Quite large	Comparatively, small
Data Accessing	Fast	Slow
Additional Disk Space	Not required	Required to store indexes separately
Type of Key	By default, the primary key of a table is a clustered index	It can be used with the unique constraint on the table that acts as a composite key
Main Feature	Improves the performance of data retrieval	Should be created on columns used in Joins

## 29. What do you know about CDC in SQL Server?

CDC refers to change data capture. It captures recent INSERT, DELETE, and UPDATE activity applied to SQL Server tables. It records changes to SQL Server tables in a compatible format.

## 30. What is the difference between SQL and MySQL?

Now Let's compare the difference between [SQL](#) and [MySQL](#).

SQL	MySQL
It is a structured query language used in a database	It is a database management system
It is used for query and operating database systems,	It allows data handling, storing, and modification in an organized manner
It is always the same	It keeps updating
It supports only a single storage engine	It supports multiple storage engines
The server is independent	During backup sessions, the server blocks the database

## 31. State the differences between SQL and PL/SQL

SQL	PL/SQL
It is a database-structured query language	It is a programming language for a database that uses SQL
It is an individual query that is used to execute DML and DDL commands	It is a block of codes used to write the entire procedure or a function

It is a declarative and data-oriented language	It is a procedural and application-oriented language
It is mainly used for data manipulation	It is used for creating applications
It provides interaction with the database server	It does not provide interaction with the database server
It cannot contain PL/SQL code	It can contain SQL because it is an extension of SQL

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## 32. What is the ACID property in a database?

The full form of **ACID** is atomicity, consistency, isolation, and durability. ACID properties are used to check the reliability of transactions.

- Atomicity refers to completed or failed transactions, where a transaction refers to a single logical operation on data. This implies that if any aspect of a transaction fails, the whole transaction fails and the database state remains unchanged.
- Consistency means that the data meets all validity guidelines. The transaction never leaves the database without finishing its state.
- Concurrency management is the primary objective of isolation.
- Durability ensures that once a transaction is committed, it will occur regardless of what happens in between such as a power outage, fire, or some other kind of disturbance.

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### 33. What is the need for group functions in SQL?

Group functions operate on a series of rows and return a single result for each group. COUNT(), MAX(), MIN(), SUM(), AVG(), and VARIANCE() are some of the most widely used group functions.

### 34. What do you understand about a character manipulation function?

Character manipulation functions are used for the manipulation of character data types.

Some of the character manipulation functions are as follows:

UPPER: It returns the string in uppercase.

Syntax:

```
1 UPPER('string')
```

Example:

```
1 SELECT UPPER('demo string') from String;
```

Output:

```
1 DEMO STRING
```

LOWER: It returns the string in lowercase.

Syntax:

```
1 LOWER('STRING')
```

Example:

```
1 SELECT LOWER ('DEMO STRING') from String
```

Output:

```
1 demo string
```

INITCAP: It converts the first letter of the string to uppercase and retains others in lowercase.

Syntax:

```
1 Initcap('sSTRING')
```

Example:

```
1 SELECT Initcap('dATASET') from String
```

Output:

```
1 Dataset
```

CONCAT: It is used to concatenate two strings.

Syntax:

```
1 CONCAT('str1','str2')
```

Example:



```
1 SELECT CONCAT('Data','Science') from String
```

Output:

```
1 Data Science
```

LENGTH: It is used to get the length of a string.

Syntax:

```
1 LENGTH('String')
```

Example:

```
1 SELECT LENGTH('Hello World') from String
```

```
1 Output: 11
```

## 35. What is AUTO\_INCREMENT?

AUTO\_INCREMENT is used in SQL to automatically generate a unique number whenever a new record is inserted into a table.

Since the primary key is unique for each record, this primary field is added as the AUTO\_INCREMENT field so that it is incremented when a new record is inserted.

The AUTO-INCREMENT value starts at 1 and is incremented by 1 whenever a new record is inserted.

Syntax:

```
1 CREATE TABLE Employee (  
2 Employee_id int NOT NULL AUTO-INCREMENT,  
3 Employee_name varchar(255) NOT NULL,  
4 Employee_designation varchar(255)  
5 Age int,  
6 PRIMARY KEY (Employee_id)  
7 )
```

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## 36. What is a “TRIGGER” in SQL?

The [trigger](#) can be defined as an automatic process that happens when an event occurs in the database server. It helps to maintain the integrity of the table. The trigger is activated when the commands, such as insert, update, and delete, are given.

The syntax used to generate the trigger function is as follows:

```
1 CREATE TRIGGER trigger_name
```

## 37. Where are usernames and passwords stored in SQL Server?

In SQL Server, usernames and passwords are stored in the main database in the sysxlogins table.

### **38. What are the types of relationships in SQL Server databases?**

Relationships are developed by interlinking the columns of one table with the column of another table. There are three different types of relationships, which are as follows:

- One-to-one relationship
- Many-to-one relationship
- Many-to-many relationship

### **39. How can you handle expectations in SQL Server?**

TRY and CATCH blocks handle exceptions in SQL Server. Put the SQL statement in the TRY block and write the code in the CATCH block to handle expectations. If there is an error in the code in the TRY block, then the control will automatically move to the CATCH block.

## **Advanced SQL Interview Questions for Experienced**

### **40. Which command is used to find out the SQL Server version?**

The following command is used to identify the version of SQL Server:

```
1  Select SERVERPROPERTY ('productversion')
```

## 41. What is the COALESCE function?

The **COALESCE** function takes a set of inputs and returns the first non-null value.

Syntax:

```
1  COALESCE (val1, val2, val3, ....., nth val)
```

Example:

```
1  SELECT COALESCE (NULL, 1, 2, 'MYSQL')
```

Output:

```
1  1
```

## 42. What do you know about magic tables in SQL Server?

A magic table can be defined as a provisional logical table that is developed by an SQL Server for tasks such as insert, delete, or update (DML) operations. The operations recently performed on the rows are automatically stored in magic tables. Magic tables are not physical tables; they are just temporary internal tables.

## 43. Explain Inner Join with an example.

Inner Join gives us those records that have matching values in two tables.

Let us assume that we have two tables: Table A and Table B. When we apply Inner Join to these two tables, we will get only records common to both Table A and Table B.

Syntax:

```
1  SELECT columns
2  FROM table1
3  INNER JOIN table2
4  ON table1.column_x=table2.column_y;
```

Example:

```
1  select * from employee
2  select * from department
```

Output:

	d_id	d_name	d_location
1	1	Content	New York
2	2	Support	Chicago
3	3	Analytics	New York
4	4	Sales	Boston
5	5	Tech	Dallas
6	6	Finance	Chicago

Now, we will apply Inner Join to both these tables, where the e\_dept column in the employee table is equal to the d\_name column of the department table.

Syntax:

```
1  select employee.e_name, employee.e_dept, department.d_name,  
   department.d_location  
  
2  from employee inner join department  
  
3  on  
  
4  employee.e_dept=department.d_name
```

Output:

	e_name	e_dept	d_name	d_location
1	Bob	Support	Support	Chicago
2	Anne	Analytics	Analytics	New York
3	Julia	Analytics	Analytics	New York
4	Matt	Sales	Sales	Boston

After applying Inner Join, we have only those records where the departments match in both tables. As we can see, the matched departments are Support, Analytics, and Sales.

## 44. What are the types of views in SQL?

In SQL, the views are classified into four types. They are the following:

- Simple View: It is a view based on a single table and does not have a GROUP BY clause or other features.
- Complex View: It is a view built from several tables and includes a GROUP BY clause as well as functions.
- Inline View: It is a view built on a subquery in the FROM clause, which provides a temporary table and simplifies a complicated query.
- Materialized View: It is a view that saves both the definition and the details. It builds data replicas by physically preserving them.

## SQL Interview Questions for 3 Years Experienced

### 45. How many authentication modes are there in SQL Server? What are they?

Two authentication modes are available in SQL Server. They are as follows:

- Windows Authentication Mode: It allows authentication for Windows but not for SQL Server.
- Mixed Mode: It allows both types of authentication—Windows and SQL Server.

### 46. What is a function in SQL Server?

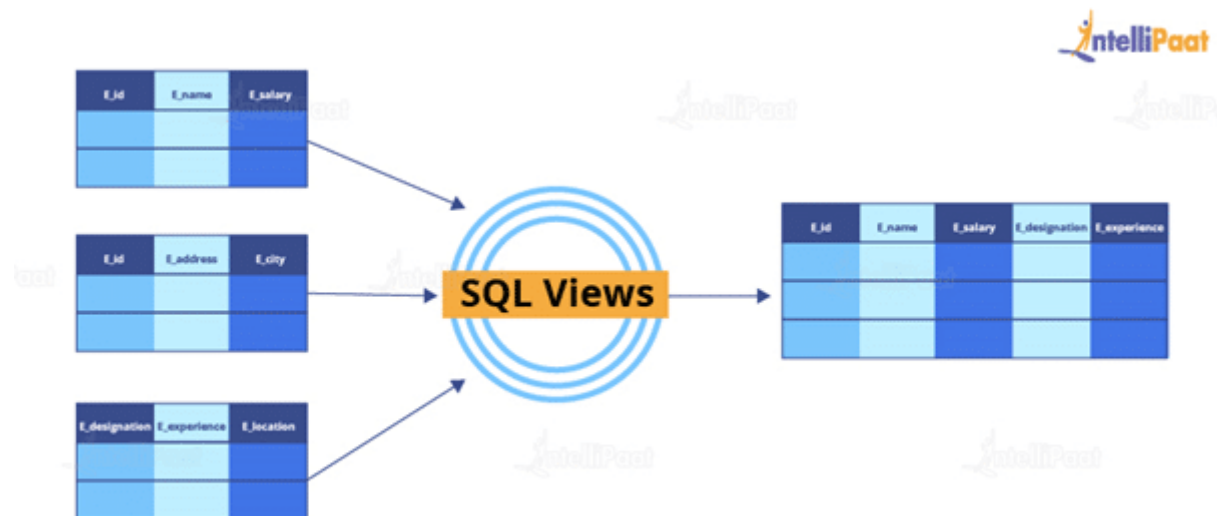
A function is an SQL Server database object. It is basically a set of SQL statements that allow input parameters, perform processing, and return results only. A function can only return a single value or table. The ability to insert, update, and delete records in database tables is not available.

### 47. What is SQL Server Agent?

SQL Server Agent plays an important role in the daily work of SQL Server administrators or DBAs. This is one of the important parts of SQL Server. The aim of the server agent is to easily implement tasks using a scheduler engine that enables the tasks to be performed at scheduled times. SQL Server Agent uses SQL Server to store scheduled management task information.

### 48. What are views? Give an example.

Views are virtual tables used to limit the tables that we want to display. Views are nothing but the result of an SQL statement that has a name associated with it. Since views are not physically present, they take less space to store.



Let us consider an example. In the following employee table, say we want to perform multiple operations on the records with the gender "Female". We can create a view-only table for the female employees from the entire employee table.

Now, let us implement it on SQL Server.

This is the employee table:

```
1 select * from employee
```

	e_id	e_name	e_salary	e_age	e_gender	e_dept
1	1	Sam	95000	45	Male	Operations
2	2	Bob	80000	21	Male	Support
3	3	Anne	125000	25	Female	Analytics
4	4	Julia	112000	30	Female	Analytics
5	5	Matt	159000	33	Male	Sales
6	6	Jeff	112000	27	Male	Operations

Now, we will write the syntax for the view.



Syntax:

```
1 create view female_employee as select * from employee where
   e_gender='Female'

2 select * from female_employee
```

Output:

	e_id	e_name	e_salary	e_age	e_gender	e_dept
1	3	Anne	125000	25	Female	Analytics
2	4	Julia	112000	30	Female	Analytics

## 49. State the differences between views and tables.

Views	Tables
A view is a virtual table that is extracted from a database.	A table is structured with a set number of columns and a boundless number of rows.
A view does not hold the data itself.	A table contains data and stores it in databases.
A view is utilized to query certain information contained in a few distinct tables.	A table holds fundamental client information and cases of a characterized object.
In a view, we will get frequently queried information.	In a table, changing the information in the database changes the information that appears in the view.



## 50. What do you understand by Self Join? Explain using an example

**Self Join in SQL** is used for joining a table with itself. Here, depending on some conditions, each row of the table is joined with itself and with other rows of the table.

Syntax:

```
1  SELECT a.column_name, b.column_name
2  FROM table a, table b
3  WHERE condition
```

Example:

Consider the customer table given below.

ID	Name	Age	Address	Salary
1	Anand	32	Ahmedabad	2,000.00
2	Abhishek	25	Delhi	1,500.00

3	Shivam	23	Kota	2,000.00
4	Vishal	25	Mumbai	6,500.00
5	Sayeedul	27	Bhopal	8,500.00
6	Amir	22	MP	4,500.00
7	Arpit	24	Indore	10,000.00

We will now join the table using Self Join:

```
SQL > SELECT a.ID, b.NAME, a.SALARY  
FROM CUSTOMERS a, CUSTOMERS b  
WHERE a.SALARY < b.SALARY;[/code] Output:
```

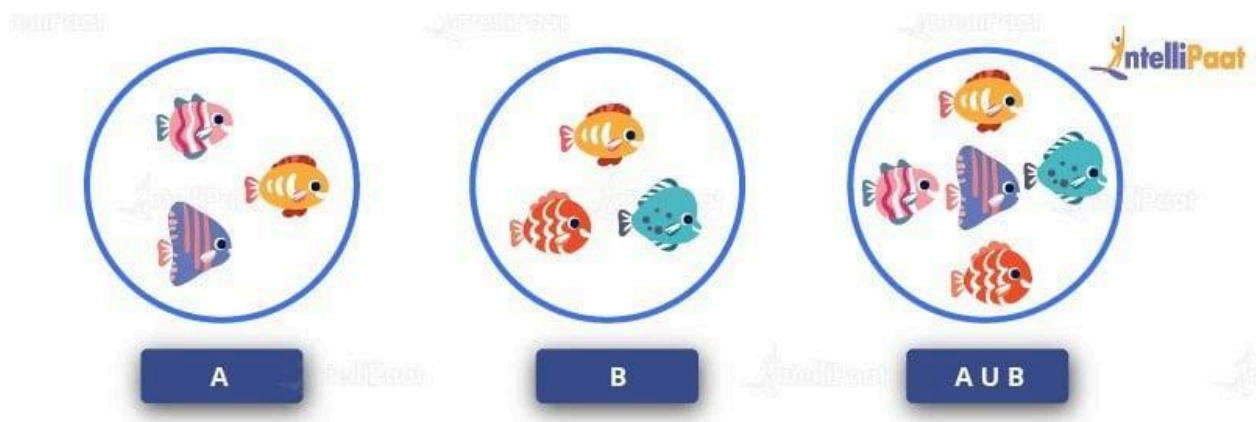
ID	Name	Salary
2	Anand	1,500.00
2	Abhishek	1,500.00
1	Vishal	2,000.00
2	Vishal	1,500.00
3	Vishal	2,000.00

6	Vishal	4,500.00
1	Sayeedul	2,000.00
2	Sayeedul	1,500.00
3	Sayeedul	2,000.00
4	Sayeedul	6,500.00
6	Sayeedul	4,500.00
1	Amir	2,000.00
2	Amir	1,500.00
3	Amir	2,000.00
1	Arpit	2,000.00
2	Arpit	1,500.00
3	Arpit	2,000.00
4	Arpit	6,500.00

5	Arpit	8,500.00
6	Arpit	4,500.00

## 51. What is the difference between Union and Union All operators?

The **union operator** is used to combine the result set of two or more select statements. For example, the first select statement returns the fish shown in Image A, and the second statement returns the fish shown in Image B. The Union operator will then return the result of the two select statements as shown in Image A U B. If there is a record present in both tables, then we will get only one of them in the final result.



Syntax:

```
1 SELECT column_list FROM table1
```

Union:

```
1 SELECT column_list FROM table2
```

Now, we will execute it in the SQL Server.

These are the two tables in which we will use the Union operator.

	s_id	s_name	s_marks
1	1	Sam	45
2	2	Bob	87
3	3	Anne	73
4	4	Julia	92

	s_id	s_name	s_marks
1	3	Anne	73
2	4	Julia	92
3	5	Matt	65

```
1 select * from student_details1
```

Union:

```
1 select * from student_details2
```

Output:

Results		Messages	
	s_id	s_name	s_marks
1	1	Sam	45
2	2	Bob	87
3	3	Anne	73
4	4	Julia	92
5	5	Matt	65

The Union All operator gives all the records from both tables including the duplicates.



Let us implement it in the SQL Server.

Syntax:

```
1 select * from student_details1
```

Union All:

```
1 select * from student_details2
```

Output:

	s_id	s_name	s_marks
1	1	Sam	45
2	2	Bob	87
3	3	Anne	73
4	4	Julia	92
5	3	Anne	73
6	4	Julia	92
7	5	Matt	65

## 52. Can you identify the employee who has the third-highest salary from the given employee table (with salary-related data)?

Consider the following employee table. In the table, Sabid has the third-highest salary (60,000).

Name	Salary
Tarun	70,000
Sabid	60,000
Adarsh	30,000
Vaibhav	80,000

Below is a simple query to find out which employee who has the third-highest salary. The functions RANK, DENSE RANK, and ROW NUMBER are used to obtain the increasing integer value by imposing the ORDER BY clause in the SELECT statement, based on the ordering of the rows. The ORDER BY clause is necessary when the RANK, DENSE RANK, or ROW NUMBER functions are used. On the other hand, the PARTITION BY clause is optional.

```
1
  WITH CTE AS
2
  (
3
```



```
4  SELECT Name, Salary, RN = ROW_NUMBER() OVER (ORDER BY Salary
    DESC) FROM EMPLOYEE
5
    )

    SELECT Name, Salary FROM CTE WHERE RN =3
```

## 53. How would you find the second-highest salary in a table?

There are several ways to find the second highest salary in a table.

1. Using the ORDER BY, LIMIT, and OFFSET Clauses:

```
1  SELECT distinct(salary) from table_name ORDER BY salary DESC
    LIMIT 1 OFFSET 1;
```

2. Using Subquery:

```
1  SELECT MAX(salary) AS salary
2  FROM table_name WHERE salary <> (SELECT MAX(salary)
3  FROM table_name);
4
5
6  Where,
```

7 table\_name: your table name

8 salary: salary column present in your table

## 54. What is an effective way to prevent SQL injection in your queries?

The effective way to prevent SQL injection attacks is through input validation and parameterized queries, which include prepared statements. The developer can sanitize all the inputs, not only just the web form input, because the application code should never use the input directly.

## 55. What is the significance of an index in a database, and how do you use it?

Database indexing helps the DBMS find the specific rows in a table very quickly. The most common database index is the B-tree Index. A B-tree index is a situation where the data has few distinct values, such as name, dates or state codes.

## 56. What is the significance of transactions, and how do you ensure their consistency?

Transactions help to ensure the data consistency and integrity of the data; they also protect against errors by grouping many actions into a single unit.

Transaction funds from one account to another are the best example of ensuring data consistency; the total value of the funds in both accounts is the same at the start and end of each transaction.

## 57. How will you optimize a slow-moving SQL query? What are some of the optimization techniques?

We can optimize a slow-moving SQL query by using indexing in the DBMS to find the specific rows in a table very quickly.

There are several optimization techniques:

1. Indexing
2. Using Distinct
3. Having and Where clauses
4. Avoiding correlated subqueries
5. Limit
6. Column statistics

## SQL Interview Questions for 5 Years Experienced

### 58. What is wrong with the following SQL query?

```
1  SELECT gender, AVG(age) FROM employee WHERE AVG(age) > 30  
   GROUP BY gender
```

When this command is executed, it gives the following error:

```
1  Msg 147, Level 16, State 1, Line 1
```

Aggregation may not appear in the WHERE clause unless it is in a subquery contained in the HAVING clause or a select list; the column being aggregated is an outer reference.

```
1 Msg 147, Level 16, State 1, Line 1
```

```
2 Invalid column name 'gender'.
```

This means that whenever we work with [aggregate functions](#) and use the GROUP BY clause, we cannot use the WHERE clause. Therefore, instead of the WHERE clause, we should use the HAVING clause.

When we use the HAVING clause, the GROUP BY clause should come first, followed by the HAVING clause.

```
1 select e_gender, avg(e_age) from employee group by e_gender
   having avg(e_age) > 30
```

Output:

	e_gender	(No column name)
1	Male	31

## 59. What do you know about the stuff() function?

The stuff() function deletes a part of the string and then inserts another part into the string, starting at a specified position.

Syntax:

```
1 STUFF(String1, Position, Length, String2)
```

Here, String1 is the one that will be overwritten. The position indicates the starting location for overwriting the string. Length is the length of the substitute string, and String2 is the string that will overwrite String1.

Example:

```
1  select stuff('SQL Tutorial',1,3,'Python')
```

This will change 'SQL Tutorial' to 'Python Tutorial'

Output:

```
1  Python Tutorial
```

## 60. What is a stored procedure? Give an example.

A stored procedure is a prepared SQL code that can be saved and reused. In other words, we can consider a stored procedure to be a function consisting of many SQL statements to access the database system. We can consolidate several SQL statements into a stored procedure and execute them whenever and wherever required.

A stored procedure can be used as a means of modular programming, i.e., we can create a stored procedure once, store it, and call it multiple times as required. This also supports faster execution when compared to executing multiple queries.

Syntax:

```
1  CREATE PROCEDURE procedure_name  
  
2  AS  
  
3  Sql_statement  
  
4  GO;
```

5 **To execute** we will use this:

6 **EXEC** procedure\_name

Example:

We are going to create a stored procedure that will help us extract the age of the employees.

1 **create procedure** employee\_age

2 **as**

3 **select** e\_age **from** employee

4 **go**

Now, we will execute it.

1 **exec** employee\_age

Output:

	e_age
1	45
2	21
3	25
4	30
5	33
6	27

**61. What do you understand about a temporary table?  
Write a query to create a temporary table**

A temporary table helps us store and process intermediate results. Temporary tables are created and can be automatically deleted when they are no longer used. They are very useful in places where temporary data needs to be stored.


Syntax:

- 1 **CREATE TABLE** #table\_name();
- 2 The below query will **create** a **temporary table**:
- 3 **create table** #book(b\_id **int**, b\_cost **int**)
- 4 Now, we will **insert** the records.
- 5 **insert into** #book **values** (1,100)
- 6 **insert into** #book **values** (2,232)
- 7 **select** \* **from** #book

Output:

	b_id	b_cost
1	1	100
2	2	232

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## 62. What is a database cursor? How to use a database cursor?

A database **cursor** is a control that allows you to navigate around a table's rows or documents. It can be referred to as a pointer for a row in a set of rows. Cursors are extremely useful for database traversal operations such as extraction, insertion, and elimination.

- After any variable declaration, DECLARE a cursor. A SELECT statement must always be aligned with the cursor declaration.
- To initialize the result set, OPEN statements must be called before fetching the rows from the result table.
- To grab and switch to the next row in the result set, use the FETCH statement.
- To deactivate the cursor, use the CLOSE expression.
- Finally, use the DEALLOCATE clause to uninstall the cursor description and clear all the resources associated with it.

Here is an example SQL cursor:

```
1  DECLARE @name VARCHAR (50)

2  DECLARE db_cursor CURSOR FOR

3  SELECT name

4  From myDB.company

5  WHERE employee_name IN ('Jay', 'Shyam')

6  OPEN db_cursor
```



```
7  FETCH next

8  FROM db_cursor

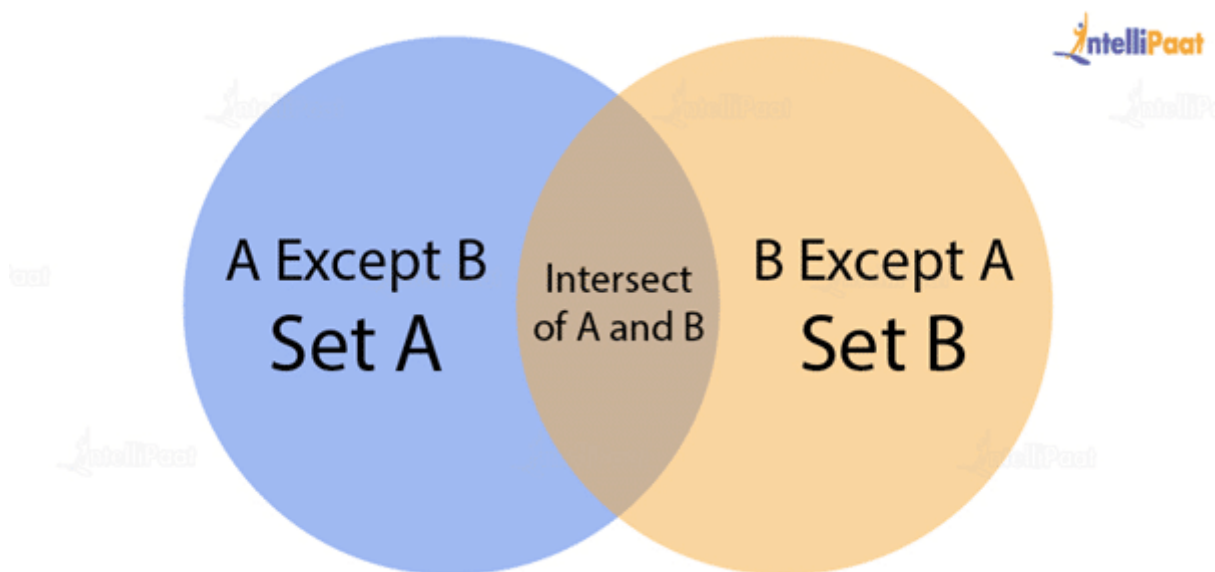
9  Into @name

10 Close db_cursor

11 DEALLOCATE db_cursor
```

## 63. What is the use of the INTERSECT operator?

The **INTERSECT** operator helps combine two select statements and returns only those records that are common to both select statements. After we get Table A and Table B over here, and if we apply the INTERSECT operator on these two tables, then we will get only those records that are common to the result of the select statements of these two tables.



Syntax:

```
1 SELECT column_list FROM table1
```

```
2 INTERSECT
```

```
3 SELECT column_list FROM table2
```

Now, let us take a look at an example of the INTERSECT operator.

```
1 select * from student_details1
```

```
2 select * from student_details1
```

Output:

	s_id	s_name	s_marks
1	1	Sam	45
2	2	Bob	87
3	3	Anne	73
4	4	Julia	92

	s_id	s_name	s_marks
1	3	Anne	73
2	4	Julia	92
3	5	Matt	65

```
1 select * from student_details1
```

```
2 intersect
```

```
3 select * from student_details2
```

Output:

	s_id	s_name	s_marks
1	3	Anne	73
2	4	Julia	92

## 64. Describe how to delete duplicate rows using a single statement but without any table creation.

Let us create an employee table where the column names are ID, NAME, DEPARTMENT, and EMAIL. Below are the SQL scripts for generating the sample data:

```
1  CREATE TABLE EMPLOYEE
2  (
3  ID INT,
4  NAME Varchar(100),
5  DEPARTMENT INT,
6  EMAIL Varchar(100)
7  )
8  INSERT INTO EMPLOYEE VALUES (1, 'Tarun', 101, '[email
9  protected]')
10 INSERT INTO EMPLOYEE VALUES (2, 'Sabid', 102, '[email
protected]')
```

```
11 INSERT INTO EMPLOYEE VALUES (3, 'Adarsh', 103, '[email
    protected]')
12
13 INSERT INTO EMPLOYEE VALUES (4, 'Vaibhav', 104, '[email
    protected]')
```

```
14 -These are the duplicate rows:
```

```
INSERT INTO EMPLOYEE VALUES (5, 'Tarun', 101, '[email
protected]')
```

```
INSERT INTO EMPLOYEE VALUES (6, 'Sabid', 102, '[email
protected]')
```

ID	NAME	DEPARTMENT	EMAIL
1	Tarun	101	tarun@intellipaat.com
2	Sabid	102	sabid@intellipaat.com
3	Adarsh	103	adarsh@intellipaat.com
4	Vaibhav	104	vaibhav@intellipaat.com
5	Tarun	101	tarun@intellipaat.com
6	Sabid	102	sabid@intellipaat.com

We can see the duplicate rows in the above table.

```
1 DELETE e1 FROM EMPLOYEE e1, EMPLOYEE e2 WHERE e1.name =
    e2.name AND e1.id > e2.id
```

The SQL query above will delete the rows, where the name fields are duplicated, and it will retain only those unique rows in which the names are unique and the ID fields are the lowest, i.e., the rows with IDs 5 and 6 are deleted, while the rows with IDs 1 and 2 are retained.

ID	NAME	DEPARTMENT	EMAIL
1	Tarun	101	tarun@intellipaat.com
2	Sabid	102	sabid@intellipaat.com
3	Adarsh	103	adarsh@intellipaat.com
4	Vaibhav	104	vaibhav@intellipaat.com

## 65. Explain database white box testing and black box testing.

The [white box testing](#) method mainly deals with the internal structure of a particular database, where users hide specification details. The white box testing method involves the following:

- As the coding error can be detected by testing the white box, it can eliminate internal errors.
- To check for the consistency of the database, it selects the default table values.
- This method verifies the referential integrity rule.
- It helps perform the module testing of database functions, triggers, views, and SQL queries.

The black box testing method generally involves interface testing and database integration. The black box testing method involves the following:

- Mapping details
- Verification of incoming data
- Verification of outgoing data from the other query functions

## 66. What is Blocking and Troubleshooting?

**Blocking:** Blocking occurs when one session holds a lock on a specific resource and a second SPID attempts to acquire a conflicting lock type on the same resource.

**Troubleshooting:** To start the troubleshooting, you first have to define the symptoms. Troubleshooting starts with identifying the biggest CPU resource users.

The most common SQL server performance symptoms are CPU, memory, network, and slow-running queries.

## **67. What is an Optimal Disk Configuration for a server?**

Optimal Disk Configuration involves strategically organizing and using storage resources on a server, which helps us achieve the best performance and reliability for a specific workload. The main aim of optimal disk configuration is to minimize bottlenecks and ensure efficient support for the read and write demands of the database.

## **68. What is a Deadlock or a live Deadlock, and how do you resolve it?**

A deadlock is a situation where a set of processes are blocked because each process is holding the resource and waiting for the other resource. A live deadlock is just like a deadlock-like situation where the processes block each other with a repeated state change yet make no progress.

There are several ways to prevent a deadlock or live deadlock situation:

1. Acquired multiple locks for a thread.
2. Abort and restart the process.
3. Timeouts
4. Transaction Rollback

## **69. What are statistics in SQL, and how do you update them?**

Statistics in SQL help us compute the standard statistics, which help us execute the SQL queries more efficiently. The statistics will help us understand the total structure of the data. There are various functions that we can use in statistics, such

as MEAN, MAX, MIN, MEDIAN, MODE, and Standard Deviation, and we can also use inferential statistics in SQL, like t-test, f-test, ANOVA, and analytics functions.

Updating statistics for a specific table

1. Go to the menu of the table and choose Definition.
2. Open the Optimizer Statistics tab page.
3. Choose the Update option in the context menu of the Table Statistics field.
4. Define the sample type and size that you want to use to generate the statistics.

## 70. What is an efficient structure to speed up the table reads?

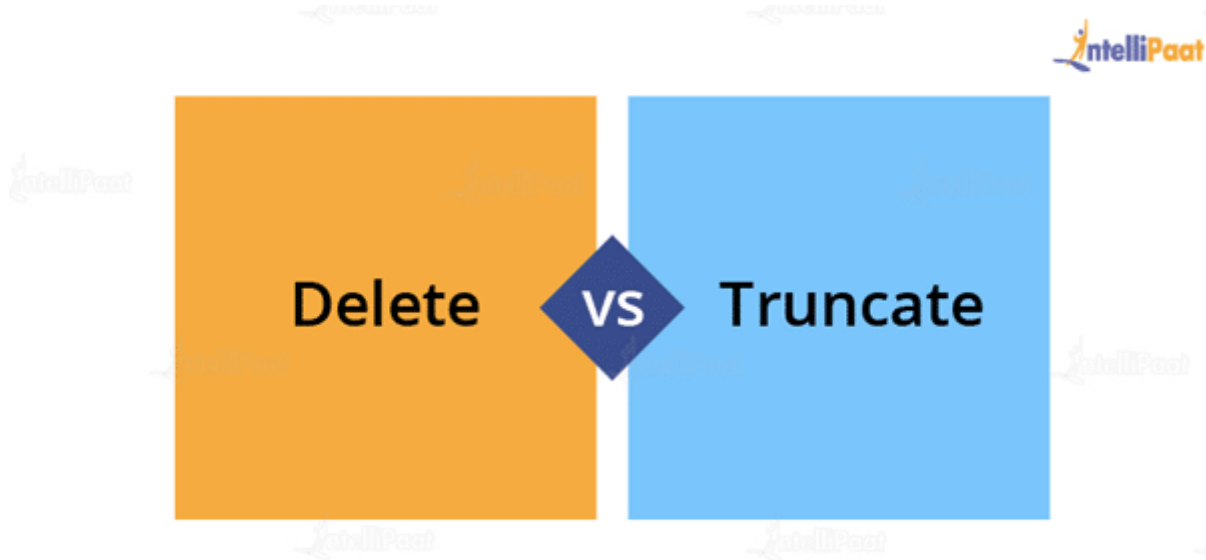
With the help of Database Indexing we can improve the speed of the table read.

Database indexing helps DBMS find the specific rows in a table very quickly. The most common database index is the B-tree Index.that has few distinct values, such as name, dates, or state codes.

## SQL Technical Interview Questions

### 71. What is the difference between the DELETE and TRUNCATE commands?

- DELETE:This query is used to delete or remove one or more existing tables.
- TRUNCATE:This statement deletes all the data inside a table.



The differences between DELETE and TRUNCATE commands are the following:

- TRUNCATE is a DDL command, and DELETE is a DML command.
- With TRUNCATE, we cannot really execute and trigger, while with DELETE, we can accomplish a trigger.
- If a table is referenced by foreign key constraints, then TRUNCATE will not work. So, if we have a foreign key, we have to use the DELETE command.

The syntax for the DELETE command is as follows:

```
1  DELETE FROM table_name  
  
2  [WHERE condition];
```

Example:

```
1  select * from stu
```



Output:

	s_id	s_name	s_marks
1	1	Sam	50
2	2	Bob	50
3	3	Julia	50

```
1 delete from stu where s_name='Bob'
```

Output:

	s_id	s_name	s_marks
1	1	Sam	50
2	3	Julia	50

The syntax for the TRUNCATE command:

```
1 TRUNCATE TABLE  
2 Table_name;
```

Example:

```
1 select * from stu1
```

Output:

	s_id	s_name	s_marks
1	1	Sam	50
2	2	Bob	50
3	3	Matt	50

```
1 truncate table stu1
```

Output:

s_id	s_name	s_marks
------	--------	---------

This deletes all the records from a table.



## 72. What is the difference between the DROP and TRUNCATE commands?

If a table is dropped, all things associated with that table are dropped as well. This includes the relationships defined on the table with other tables, access privileges, and grants that the table has, as well as the integrity checks and constraints.

To create and use the table again in its original form, all the elements associated with the table need to be redefined.

However, if a table is truncated, there are no such problems as mentioned above. The table retains its original structure.

## 73. What are the third-party tools that are used in SQL Server?

The following is the list of third-party tools that are used in SQL Server:

- SQL CHECK
- SQL DOC 2
- SQL Backup 5

- SQL Prompt
- Litespeed 5.0

## 74. Can we link SQL Server with others?

Yes, SQL Server can be linked with other database systems using various methods. One common method is through the use of linked servers. Linked servers allow SQL Server to establish connections and access data from other database platforms. By configuring appropriate settings and creating the necessary connections, SQL Server can interact with databases such as MySQL, Oracle, PostgreSQL, and more, enabling data integration and querying across multiple systems.

Also, check out the blog on [PostgreSQL vs. MySQL](#).

## 75. What are some common clauses used with SELECT queries in SQL?

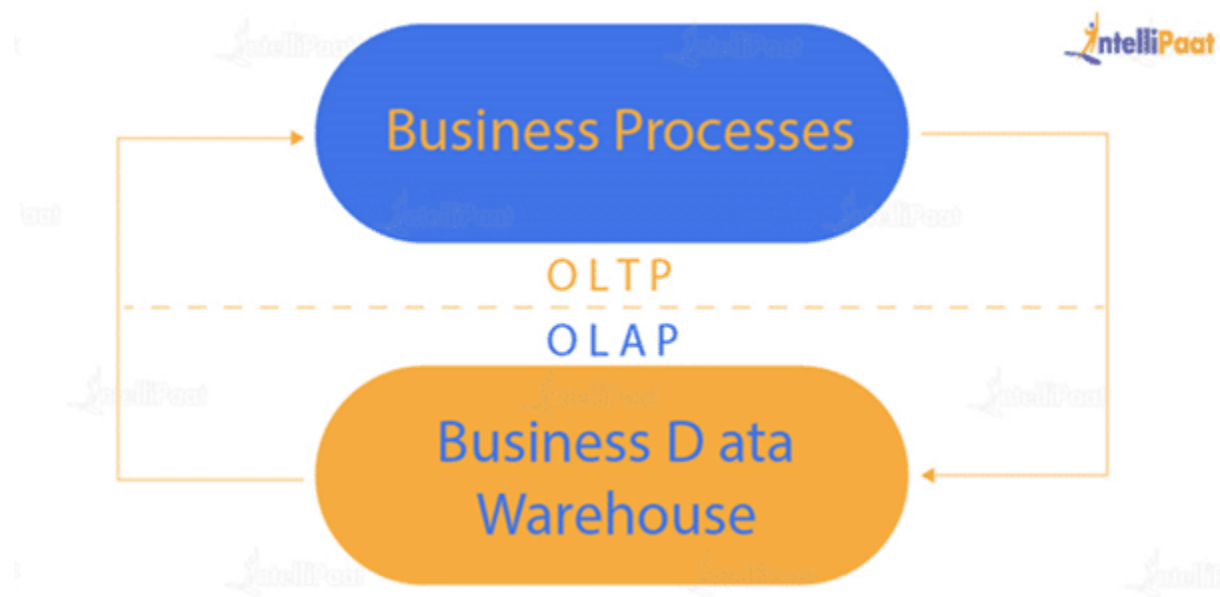
There are many [SELECT statement](#) clauses in SQL. Some of the most commonly used clauses with SELECT queries are as follows:

- FROM  
The FROM clause defines the tables and views from which data can be interpreted. The tables and views listed must exist at the time the question is given.
- WHERE  
The WHERE clause defines the parameters that are used to limit the contents of the results table. You can test for basic relationships or for relationships between a column and a series of columns using subselects.
- GROUP BY  
The GROUP BY clause is commonly used for aggregate functions to produce a single outcome row for each set of unique values in a set of columns or expressions.

- ORDER BY  
The ORDER BY clause helps in choosing the columns on which the table's result should be sorted.
- HAVING  
The HAVING clause filters the results of the GROUP BY clause by using an aggregate function.

## 76. Explain the difference between OLTP and OLAP.

OLTP: It stands for online transaction processing, and we can consider it a category of software applications that are efficient for supporting transaction-oriented programs. One of the important attributes of the OLTP system is its potential to maintain consistency. The OLTP system often follows decentralized planning to avoid single points of failure. This system is generally designed for a large audience of end users to perform short transactions. The queries involved in such databases are generally simple, require a fast response time, and, in comparison, return only a few records. So, the number of transactions per second acts as an effective measure for those systems.



OLAP: It stands for online analytical processing, and it is a category of software programs that are identified by a comparatively lower frequency of online

transactions. For OLAP systems, the efficiency of computing depends heavily on the response time. Hence, such systems are generally used for data mining or maintaining aggregated historical data, and they are usually used in multidimensional schemas.



## 77. What is Hybrid OLAP?

Hybrid OLAP (HOLAP) uses a combination of multidimensional data structures and relational database tables to store multidimensional data. The aggregations for a HOLAP partition are stored by analysis services in a multidimensional structure. The facts are stored in a relational database.


## 78. How can you copy data from one table to another table?



Here, we have our employee table.



e_id	e_name	E_salary	e_age	e_gender	e_dept
1	Sam	95000	45	Male	Operations
2	Bob	80000	21	Male	Support
3	Anne	125000	25	Female	Analytics
4	Julia	73000	30	Female	Analytics
5	Matt	159000	33	Male	Sales
6	Jeff	112000	27	Male	Operations



We have to copy this data into another table. For this purpose, we can use the INSERT INTO SELECT operator. Before we go ahead and do that, we will have to create another table that will have the same structure as the above-given table.

Syntax:

```
1  create table employee_duplicate(  
2  e_id int,  
3  e_name varchar(20),  
4  e_salary int,  
5  e_age int,  
6  e_gender varchar(20)  
7  e_dept varchar(20)  
8  )
```

For copying the data, we will use the following query:

```
1 insert into employee_duplicate select * from employees
```

Let us take a look at the copied table.

```
1 select * from employee_duplicate
```

Output:



	e_id	e_name	e_salary	e_age	e_gender	e_dept
1	1	Sam	95000	45	Male	Operations
2	2	Bob	80000	21	Male	Support
3	3	Anne	125000	25	Female	Analytics
4	4	Julia	112000	30	Female	Analytics
5	5	Matt	159000	33	Male	Sales
6	6	Jeff	112000	27	Male	Operations

## 79. What is the difference between BETWEEN and IN operators in SQL?

The **BETWEEN operator** is employed to identify rows that fall within a specified range of values, encompassing numerical, textual, or date values. It returns the count of values that exist between the two defined boundaries.

On the other hand, the IN operator serves as a condition operator utilized for searching values within a predetermined range. When multiple values are available for selection, the IN operator is utilized.

Check out how to use [IN and BETWEEN Operators in SQL](#) with examples.

## 80. What is the difference between HAVING and WHERE clauses?

The main difference between the 'HAVING' and 'WHERE' clauses in SQL is that the 'WHERE' clause operates on individual rows of data, while the 'HAVING' clause is used to filter aggregated data. The 'WHERE' clause cannot be used with aggregate functions, whereas the 'HAVING' clause specifically filters results based on aggregate conditions.

Let us consider the employee table below.

Name	Department	Salary
Tarun	Production	50,000
Tarun	Testing	60,000
Sabid	Marketing	70,000
Adarsh	Production	80,000
Vaibhav	Testing	90,000

The following will select the data on a row-by-row basis:

```
1 SELECT Name, Salary FROM Employee WHERE Salary >=50000
```

Output:

Name	Salary
------	--------



Tarun	50,000
Tarun	60,000
Sabid	70,000
Adarsh	80,000
Vaibhav	90,000

The HAVING clause, on the other hand, operates on the aggregated results.

```
1  SELECT Department, SUM(Salary) AS total FROM Employee GROUP  
   BY Department
```

Output:

Department	Total
Marketing	70,000
Production	130,000
Testing	150,000

Now, let us see the output when we apply HAVING to the above query.

```
1 SELECT Department, SUM(Salary) AS total FROM Employee GROUP BY
   Department HAVING SUM(Salary)>70000
```

Output:

Department	Total
Production	130,000
Testing	150,000

## 81. How can you create empty tables with the same structure as another table?

This can be achieved by fetching the records of one table into a new table using the INTO operator while fixing a WHERE clause to be false for all records. In this way, SQL prepares the new table with a duplicate structure to accept the fetched records. However, there are no records that will get fetched due to the WHERE clause in action. Therefore, nothing is inserted into the new table, thus creating an empty table.

```
1 SELECT * INTO Students_copy
2 FROM Students WHERE 1 = 2;
```

## 82. How will you update the prices in a product column by increasing 5% of the prices in each row?

We can update the prices of the product columns by using the UPDATE method, which is part of the DML.

```
1 UPDATE table_name SET price = price*1.05;
```

Where,

table\_name: your table name

price: price column present in your table

With this code, we can easily modify the price of each product by 5%.

### 83. How will you fetch the most recent entries in a database?

We can fetch the most recent entries in a database by using the ORDER BY clause along with the timestamp column in descending order.

```
1 SELECT * FROM table_name ORDER BY timestamp_column DESC;
```

Where,

table\_name: your table name

timestamp\_column: datetime column present in your table

### 84. How will you calculate the average price of products in each category?

To calculate the average price of products in each category, we can use the aggregate function (AVG) with the price column and group it by the category column.

```
1  SELECT category, AVG(price) as average_price FROM table_name  
   GROUP BY category;
```

Where,

table\_name: table name

category: category column in your table

price: price column in your table

## 85. How will you calculate the total sales in each category of a product sales table?

To calculate the total sales in each category of a product sales table, we can use the aggregate function (SUM) with the sales amount column and group it by the category column.

```
1  SELECT category, SUM(sales_amount) as total_sales FROM sales  
   GROUP BY category;
```

Where,

sales: table name

category: category column in your table

sales\_amount: sales\_amount column in your table

## 86. How will you find the IDs or details where there have been no entries in terms of sales?

To find the IDs or details where there have been no entries in terms of sales, we can use the LEFT JOIN or NOT EXISTS clause.

Assume we have two tables: 'product' with product details and 'sales' with sales data.

Left Joins:

```
SELECT p.product_id, p.product_name FROM product p LEFT JOIN  
1 sales s ON p.product_id = s.product_id WHERE s.product_id is  
NULL;
```

Where,

p.product\_id: product id in the product table

p.product\_name: product name in the product table

s.product\_id: product id in the sales table

Here, the WHERE s.product\_id is NULL condition helps us filter out the rows where a match in the sales table is not found.

Not Exists:

```
SELECT p.product_id, p.product_name FROM products p WHERE NOT  
1 EXISTS (SELECT 1 FROM sales s WHERE s.product_id = p.product_id  
);
```

2

3

Where,

4

p.product\_id: product id in the product table

5

p.product\_name: product name in the product table

6

s.product\_id: product id in the sales table

## SQL Scenario-Based Interview Questions

**87. Suppose there is a database where information about the employees in various verticals is stored. Your task is to find the average salary of each vertical and the highest salary among the lot.**

To find the average salary of each vertical and the highest salary among the employees, we can use the group by clause along with the aggregate functions (AVG and MAX).

```
1 SELECT vertical, AVG(salary) as average_salary, MAX(salary) as  
   highest_salary FROM employees GROUP BY vertical;
```

Where,

vertical: column that you want to group

salary: column in the table

employees: table name

**88. Given data where store inventory is stored, your task is to find the top 3 products in each category in terms of prices.**

To find the top 3 products in each category in terms of price, we can group by clause along with the aggregate function (MAX) with the price column and set the limit as 3 in descending order.

```
1 SELECT category, product_name, MAX(price) as max_price FROM  
   inventory GROUP BY category, product_name ORDER BY category,  
   max_price DESC LIMIT 3;
```

Where,

category: column name having different categories

product\_name: name of the product column

price: column having the price details

inventory: table name

## 89. Write an SQL query to find the month-on-month sales of a specific product in a store.

To calculate the month-on-month sales of a specific product in a store, we can use a combination of date functions and aggregate functions.

```
SELECT EXTRACT(YEAR_MONTH FROM sale_date) AS year_month,  
1 SUM(quantity_sold) AS total_sales FROM sales WHERE product_id =  
  'your_product_id' GROUP BY year_month ORDER BY year_month;
```

Where,

sale\_date: date of the sales column

quantity\_sold: number of quantity sold column

sales: table name

product\_id: Id of the product column

your\_product\_id: pass the product ID for which you want to check.

## 90. Suppose in an organization, employees are mapped under managers. Write a SQL query that will fetch you the managers and employees working under them.

To fetch the managers and employees working under them, we can use a self-join to fetch the managers and the employees working under them.

```
SELECT M.manager_id AS manager_id, M.manager_name AS  
1 manager_name, E.employee_id AS employee_id, E.employee_name AS  
  employee_name FROM employees E JOIN employees M ON E.manager_id  
  = M.employee_id ORDER BY M.manager_id, E.employee_id;
```

Where,

manager\_id: manager id column

manager\_name: manager name column

employee\_id: employee id column

employee\_name: employee name column

## 91. In a store inventory, your task is to fetch the total quantity of the top product purchased by the customers.

To fetch the total quantity of the top product purchased by the customers, we can use a group by clause along with the limit in descending order.

```
SELECT product_id, SUM(quantity_purchased) AS  
1 total_quantity_purchased FROM purchases GROUP BY product_id  
ORDER BY total_quantity_purchased DESC LIMIT 1;
```

Where,

product\_id: product id column

quantity\_purchased: column having the no. of the quantity purchased

purchases: table name

## 92. Mention different types of replication in SQL Server?

In SQL Server, three different types of replications are available:

- Snapshot replication
- Transactional replication
- Merge replication

## SQL Cheat Sheets



Go through the following SQL Cheat Sheets and download their PDF:

- Download the PDF of the SQL Basics Cheat Sheet
- Download the PDF for SQL Constraints, Joins, Set Operators Cheat Sheet
- Download the PDF of SQL Grouping, inbuilt, subquery, views, and temp table Cheat Sheet
- Download the PDF for SQL User Define Function Cheat Sheet
- Download the PDF for SQL Exception Handling Index, Pivot, Transactions Cheat Sheet

## SQL

### SQL Basic Cheat Sheet

#### Employee Table

Consider the above table for all the examples given in the cheat sheet.

Emp_Name	Designation	Salary
Smith	Analyst	55000
Jason	Designer	75000
Andrea	Sales	35000

#### Data Types for SQL

Numeric Data Types	String Data Types	Date Types
BigInt, Smallint, int, Tinyint, Decimal	Char, Varchar, Text, nChar, nVarchar	Date, Time, Year, Datetime, Datetime offset

#### SQL Commands

Numeric Data Types

Data Definition Language (DDL)	Data Manipulation Language (DML)	Data Query Language (DQL)	Data Control Language (DCL)
Create, Alter, Drop, Truncate	Update, Insert, Delete	Select	Grant, Revoke
Example: Create table Employee (Emp_Name Varchar(25), Designation Char(25), Salary int)	Example: Update Employee SET Salary = 35000 where Salary = 25000	Example: Select * from Employee	Example: Grant Select, Insert, Delete ON mydb TO 'user1'@'localhost';
Alter table Employee Alter column Designation Char(30) Drop table Employee	Example: Delete from Employee Where Salary = 10000	Example: Select Designation from Table_name	Example: Revoke Update ON Sales From ROLE_A

#### Basic Query

##### Selecting All The Columns

Select \* from Employee

Output:

Emp_Name	Designation	Salary
Smith	Analyst	55000
Jason	Designer	75000
Andrea	Sales	35000

##### Selecting Specific Column

Select Designation from Table\_name

Output:

Designation
Analyst
Designer
Sales

#### Advance Filtering Query

With the help of comparison operator, we can perform advanced filtering in numeric or string values.  
Comparison Operator  
=, >, <, >=, <=, <>, <LIKE, IN

Get the employees records whose salary is equal to 55000 or greater than 55000

Select \* from Employee Where Salary >= 55000

Output:

Emp_Name	Designation	Salary
Smith	Analyst	55000
Jason	Designer	75000

Get the employees records whose Designation contains 'A' in it.

Output:

Emp_Name	Designation	Salary
Smith	Analyst	55000
Andrea	Sales	35000

#### Sorting Records

Sort the employees table in ascending order.

Select \* from Employee Order by Salary ASC

Output:

Emp_Name	Designation	Salary
Andrea	Sales	35000
Smith	Analyst	55000
Jason	Designer	75000

Sort the employees table in descending order.

Select \* from Employee Order by Salary DESC

Output:

Emp_Name	Designation	Salary
Jason	Designer	75000
Smith	Analyst	55000
Andrea	Sales	35000

#### Multiple Conditions

With the help of comparison operator, we can perform advanced filtering in numeric or string values.

Logical Operator

AND, OR, ANY, BETWEEN, EXISTS, IN, LIKE, NOT, OR, SOME

Get the employees records whose Designation contains 'A' in it also salary is greater than 50000

Select \* from Employee Where Designation LIKE 'A%' AND Salary > 50000

Output:

Emp_Name	Designation	Salary
Smith	Analyst	55000

Get the employees records whose Designation contains 'A' in it or the salary is greater than 50000

Output:

Select \* from Employee Where Designation LIKE 'A%' OR Salary > 50000

Emp_Name	Designation	Salary
Smith	Analyst	55000
Jason	Designer	75000
Andrea	Sales	35000

#### Basic Filtering Query

Where : The where clause is used to filter the table horizontally

Get the employees records whose salary is 55000

Select \* from Employee where Salary = 55000

Output:

Emp_Name	Designation	Salary
Smith	Analyst	55000

Check out this exclusive blog on [SQL Cheat Sheet](#) to know more!

## SQL Developer Salary on the basis of Experience

Job Role	Average Salary in India	Average Salary in the USA
----------	-------------------------	---------------------------

SQL Developer – Experience(0 – 9) years	Minimum – 4 LPA	Minimum – 60,000 USD
	Average – 5 LPA	Average – 90,000 USD
	Highest – 8 LPA	Highest – 130,000 USD

## SQL Trends in 2024

According to the Bureau of Labor Statistics US, the projected growth in demand for roles like SQL Developers and Database Administrators is expected to rise **8% faster** than the average rate from 2022 to 2032.

1. Global Demand: With more than **400,000 active jobs on LinkedIn** in the United States alone for SQL and related roles, the tally moves to more than **100,000 jobs** for the related roles.
2. Growth Projections: The growth suggested by the Bureau of Labor Statistics might increase and reach double digits in the next several years as the demand for skilled professionals who are proficient in SQL is increasing.

## Job Opportunities in SQL

The job opportunities in SQL can be different for various departments; the inclusivity of SQL enhances business solutions and hence is required in most domains and processes. Some of the job opportunities in SQL are as follows:

Job Role	Description
Database Administrator	The primary role is to ensure the efficient working of the database without any issues.
Business Analyst	The use of SQL skills often helps business analysts retrieve data for reporting and analysis.
Data Analyst	Among data analysts, SQL helps them analyze large amounts of data stored in the databases.
Data Scientist	A very efficient tool for data scientists to access and analyze large amounts of data.
Software Engineer	To interact with the databases while working on software solutions
ETL Developer	Use SQL to access and manage data, but it is primarily used in the ETL process.
Data Modeler	Data model optimization through SQL is indicated by performance.

Server Engineer	To manage servers and handle data storage and retrieval requests.
-----------------	---

## Roles and Responsibilities of a SQL Developer

A typical job description for a [SQL developer](#) is as follows:

### About the job

#### Responsibilities:

- Partner with clients in planning, designing, implementing, optimizing, administering, and evaluating BI solutions, including relational data solutions, queries, reports, dashboards, and other visualizations based on stakeholders needs
- Leverage business and statistical knowledge to transform data into information
- Design and develop BI dashboards and reports based on business requirements
- Elicit, document, and confirm business requirements and technical specifications.
- Perform data quality assessments, data transformation, and data cleansing
- Develop SQL Scripts/Procs/ETL flows to support reports, dashboards, and KPIs in Tableau Desktop.

The roles and responsibilities of a SQL developer are quite diverse and vary for different departments. Some of the most important roles and responsibilities of a SQL developer are as follows:

1. Database design, development, and solutions: To create, design, and develop database systems and solutions for various processes and requirements.
2. Data security: Maintain data security and manage databases that are monitored for suggested security measures.

3. Data migration from third party resources: Ability to efficiently retrieve data from third-party resources without hampering data integrity.
4. Documentation: The documentation for the database systems for easier collaboration.
5. Troubleshooting: Troubleshoot databases for optimization and performance.
6. Performance optimization: To be able to optimize the processes and enhance performance in terms of data retrieval, manipulation, etc.
7. Quality assurance: Assuring a seamless delivery of database solutions and enhancing their performance.

## Conclusion

SQL is an essential skill in the 21st century, time and again proved by its requirement in every major breakthrough role. Owing to its simplicity and powerful applications, SQL isn't limited to any specific domain or professionals, you can learn and master SQL for any job role, and help improve the entire workflow. Enroll in [SQL Certification training](#) to get an in-depth understanding of SQL workflows or join the path of excellence with [SQL Master Program](#) for an enriching learning experience.

*If you have any questions, post your queries at [intellipaat community](#) space or let us know in the comments, and we'll get back to you.*